



Lat 41.35209 Lon -122.28339

United States Forest
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Agriculture

Shasta-Trinity
National Forests

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Reply To: 3420

Date: April 28, 1989

Subject: Tree Mortality at McBride Springs Campground, Mt. Shasta R.D.
(Report No. N89-7)

To: Forest Supervisor, Shasta-Trinity National Forests

A high level of white fir mortality in McBride Springs Campground, Mt. Shasta R.D., prompted District Ranger Ken Showalter to request an evaluation of the area. The area was examined on April 25, 1989 by Dave Schultz and Gregg DeNitto from the FPM Northern Service Area, Melissa Marosy, pathologist from FPM in the Regional Office, and Ron Otrin, Resource Officer from the District.

McBride Springs Campground is located at about 4,000 feet elevation along the Everitt Memorial Highway. The campground is on the edge of the native forest stands just east of the Mt. Shasta brushfield and plantations. The most abundant tree species in the campground is white fir, with some ponderosa pine and incense-cedar also present. Other vegetation includes Scouler willow, bitter cherry and manzanita.

The current mortality is confined to white fir. All size classes except smaller suppressed trees were involved. The only pest organism detected in the dead trees was the fir engraver, Scolytus ventralis. The primary reason for the large amount of mortality seems to be two successive years of dry weather combined with very high basal area in parts of the campground. Although there had been some light thinning in the campground, there were spots where the basal area exceeded 500 square feet per acre. While the dead trees showed reasonable radial growth rates up to the point of death, they evidently had little resistance to attack by fir engraver by July or August of 1988.

These trees were attacked during the summer of last year, but did not begin to fade until the spring of 1989. Additional white fir in the campground will fade as the weather warms. Numerous green trees in the campground have varying amounts of resin flowing on the boles. The resin indicates the trees were attacked by the fir engraver and produced a wound response. Attacks were heavy enough on some trees that they will fade as the weather warms. Other trees were either attacked lightly or were vigorous enough to repel the attacks. Isolated or aborted attacks by the fir engraver damage the tree, both by the beetle cutting some of the conductive tissue, as well as introduction of a brown-staining fungus. Fir trees that survive attacks which kill isolated patches of cambium will have reduced vigor for some length of time, but can often produce callus tissue over the wounds and return to former growth rates.

Most of the firs in the campground which were fatally attacked during 1988 should fade by May or early June of 1989. There should be fewer trees attacked during 1989 due to greater precipitation this winter and lower basal area in some areas. Additional fir engraver attacks may occur this summer because a few





spots are still densely stocked and some trees have not had time to recover from previous patch attacks.

Removal of the current mortality in the campground will not cause a significant reduction in future mortality. The only pressing needs to remove the dead trees are for aesthetic reasons and to remove the trees before they deteriorate to the point of becoming hazardous. Because many of the fir trees have essentially been dead all winter, some deterioration has already begun. The timber value will quickly be lost but the dead trees should remain structurally sound enough that only the needles and fine twigs will be shed during the next year. If the trees have not been removed by late 1990, they will begin to shed branches during winter storms.

It would be least damaging to the residual trees to minimize the number of entries. After an initial entry to remove the obviously dead and dying trees, further salvage could be combined with entries to thin residual clumps or to treat other problems.

In addition to white fir mortality, western dwarf mistletoe, *Arceuthobium* *campylopodum*, was observed in ponderosa pine in the campground, especially at the north end. Several overstory trees were heavily infected by this parasite.

Dwarf mistletoes have several effects on their host, the principal one being a reduction in host vigor. This increases tree susceptibility to successful bark beetle attack and mortality. In ponderosa pine, bark beetles may initiate attacks on heavily infected trees. The aggregating pheromones released by successful beetle attacks will draw additional beetles into the area.

Surrounding pines, which may or may not be infected by dwarf mistletoe, may also be attacked. Infected overstory trees also provide a seed source for dwarf mistletoe infection of smaller ponderosa pines. This can lead to stunting, deformation, and mortality of future replacement pines. Attempting to regenerate ponderosa pine in the campground for a future overstory would be complicated by the presence of dwarf mistletoe.

Management Alternatives

1. Do Nothing. Some of the white fir in the campground that have green foliage are actually dead and will fade as the weather warms. During July and August of 1989, a few additional white fir which have been top-killed or injured by previous attacks will be attacked again by the fir engraver. These trees will not fade until the spring of 1990. The trees which are currently dead will begin to deteriorate and break in late 1990, about 2 years after they were attacked. Some clumps of trees will remain densely stocked and will be under stress. Trees in these clumps will have a higher risk of attack by bark beetles, especially during dry periods. Ponderosa pine infected with dwarf mistletoe will continue to be a threat to nearby uninfected ponderosa pine. In addition to being a source of dwarf mistletoe seed, their unthrifty condition makes them likely to become the focal point of a bark beetle group kill.

2. Salvage dead and dying trees. Removal of the dead trees will have little or no effect on lowering future mortality in the campground. Some additional white fir should be expected to fade by the spring of 1990. The few living white firs remaining in the areas of heavy mortality will tend to be those with small crowns and thin bark. Exposure following salvage will result in some breakage.





and sunscald. Areas of sunscald will allow entry of decay organisms and possible future breakage.

Each entry will cause some changes in stand structure and will result in some disturbance to the residual trees. The fewest number of entries will probably produce the least adverse impacts on the trees. The largest benefits of salvage would be to improve the appearance and reduce the safety hazard in the campground.

3. Thin residual aggregations. Some areas of the campground will still have stocking levels which are too high for long-term vigorous growth. A basal area of 200-250 square feet per acre is about the level that can be sustained for some length of time on this site. This level of stocking would also allow some hardwoods and shrubs to be managed for screening. In aggregations where this would remove more than about 25 percent of the basal area, it would be best to do the thinning in more than one operation with an interval of several years between thinnings to allow the residuals to increase in vigor and become more sun-tolerant. Because many of the trees are still under some stress from below normal precipitation, and some additional mortality can be anticipated, it would be prudent to defer any thinning until at least 1990.

4. Reduce impact of dwarf mistletoe. Heavily infected ponderosa pines would be removed. Lightly infected overstory pines could be pruned of witches' brooms to reduce the impact of dwarf mistletoe on tree vigor. Stunted and deformed understory ponderosa pines could be removed to reduce competition with better quality regeneration. If dwarf mistletoe infections remain in overstory trees, then ponderosa pines should not be regenerated in these areas. Regenerating species other than ponderosa pine, including hardwoods and shrubs, would be acceptable and may reduce mistletoe spread in the campground with time.

If you have any questions, or need more information, please call Dave Schultz or Gregg DeNitto at 916-246-5087.

/s/

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